

Objection

5. Claim 1 recites a tuner comprising a test port, airline, two sliding carriages a metal-dielectric combination probe each and means for remote control probes. The claimed elements are not related to one another, The claimed probe, for example, is not related to the test port or to the airline.

Because the claimed elements are not related with the claimed tuner, for the purpose of examination, examiner will treat the claimed elements as separated elements. (i.e. any probe in any tuner)

Claim 1 recites the limitation “probes” in line 6. There is insufficient antecedent basis for this limitation in the claim

Claims 5-6 are objected to under 37 CFR.1.75[®] , as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

In case Applicant amends the claims to independent form, the claims will be withdrawn from further consideration because the inventions are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process.... In this case the method of calibration as claimed can be performed using a VNA.

Response:

In effect the calibration can be done using a VNA, but this is not the subject of the claim 11 in its new amended form; the subject for patent in claim 11 is explicitly the way the tuner probes are being moved and the sequence of movement previous to each VNA measurement and the structure of the data saved; this is important, because if the probe movement in the tuner is sequenced differently, then the data cannot be saved in such structured manner, which makes them useless for the subsequent operation of “tuning”; “tuning” means here that a software routine will be able to search through the large amount of calibration data in a structured manner and find the physical probe

positions corresponding to a target impedance. So there is a fundamental difference between "blindly tuning", meaning: moving the probes and see what impedance we get versus "target tuning", meaning: asking for a concrete impedance and the tuner software is capable of finding the right positions and move the probes in order to synthesize it. The purpose of the claimed calibration sequence is to be able to do this.

Claim Rejections – 35 USC 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claim 3 is rejected under ..., as failing to comply with the enablement requirement. The claim contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains..... to make and/or use the invention.

Regarding claim 3, the claim recites the limitation "where the external diameter of the dielectric core of the probe varies between the two extremes, the zero (pure metallic probe) and the width of the slot of the airline (pure dielectric probe).

How come the diameter of the probe can be varied from zero to the width of the slot? ... the size of nothing can be varied from zero to a value.

Does Applicant mean the dielectric of the probe varies from pure metal to pure dielectric? Even if it is the case, examiner is understood because metal has dielectric. Examiner is not sure whether the pure dielectric is the relative permittivity of free space? How come a material can be varied from metal to free space?

Claim Rejections – 35 USC 102

8. The following is a quotation of the appropriate paragraphs of 35usc 102 that form the basis for the rejection under this section made in this office action.

A person shall be entitled to a patent unless:-

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the US before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purpose of this subsection of an application filed in the US only if the international application designated the US and was published under article 21(2) of such treaty in the English language.

9. Claims 1,2, 5-6 are rejected under USC 102(e) as being anticipated by Kiyokawa et al. (6,515,465)

Regarding claim 1, Kiyokawa, discloses a microwave load pull tuner comprising (Fig 14a and 14b) a test port and an idle port (any microwave coupler has test port and an idle port, see figure 1), a horizontal transmission airline in form of a slotted coaxial (Fig 14b), two sliding carriages (105b) (Fig 14a) carrying metal-dielectric combination probe each (any material has dielectric including the probe of Kiyokawa) and means (107) for remote horizontal position of the said combination.

Regarding claim 2, Kiyokawa discloses (Fig 2) the probe (50) made of a cylindrical horizontal dielectric insert (at element 53), which slides on the central conductor (41b) of the slotted airline (fig 4), which said insert is embedded inside a metallic square slug (Fig 2 & 4), which said slug slides inside and along the ground walls of the slotted airline (41a) (fig 4), parallel to the central conductor (41b).

Regarding claims 5-6, pertinence to the discussion of the objection above, the claims 5-6 are rejected as being applied to claim 1.

Response:

We respectfully disagree with the Examiner: What Kiyokawa describes in his patent is not a dielectric probe held in place by a metallic square, such as we claim in our patent application, it is rather a metallic (conductor) probe held in place by a low-permittivity dielectric (foam) square. Kiyokawa's description (column 5, lines 55ff) is cited below:

The structure of the open-ended stub probe 50 is shown in FIGS. 2 and 3(a). The stub probe 50 comprises a **center conductor 53 supported at a specific position between the sides of the ground conductor 51 by a low-permittivity dielectric 52**. That is, in length the center conductor 53 is one quarter wavelength at the fundamental frequency

and passes through the low-permittivity dielectric 52, being thereby held in place between the parallel ground conductor plates 51b that extend from the connecting portion 51a in parallel with the center conductor 53, with the upper end of the center conductor 53 not in contact with the ground conductor 51, thus forming an open circuit. The low-permittivity dielectric 52 can be formed of foam resin or Teflon or other such material having a permittivity close to 1 that can stably support the center conductor 53.

Therefore claim 1 of our application is not anticipated by Kiyokawa, neither by Tsironis.

10. Claims 1, 5, 6 are rejected under 35 USC 102(b) as being anticipated by Wolf (2,692,971).

Regarding claim 1, Wolf discloses a microwave load pull tuner comprising a test port and an idle port (any microwave coupler has test port and an idle port, see figure 1), a horizontal transmission airline in form of a slotted coaxial (16), two sliding carriages (13, 14) (the device is sliding (column 2, lines 50-55) elements 13-14 are sliding carriages) carrying a metal-dielectric combination probe each and means (M) for remote horizontal position of the said combination probe (column 3, lines 33-43). Regarding claims 5-6, pertinence to the discussion of the objection above, the claims 5-6 are rejected as being applied to claim 1.

Response:

We respectfully disagree with the Examiner; Wolf (2,692,971) does not disclose a load pull tuner, neither does he disclose a tuner at all. Wolf discloses an apparatus to be used for measuring high standing wave ratios (VSWR) using a combination of two directional couplers and a mobile sensor. Beyond the fact that Wolf's apparatus includes a (waveguide) transmission line and a movable sensor, there is no other similarity with the items claimed in this application. In consequence Wolf cannot be considered as prior art, nor can Wolf's teachings be considered as a base for a person skilled in the art to be able to modify and lead to our claims.

11. Claims 1, 5, 6 are rejected under 35 USC 102(b) as being anticipated by Cusak et al.¹ (the article "Automatic Load Contour Mapping" submitted in the IDS filed 11/07/2003)

Regarding claim 1, Cusak discloses a microwave load pull tuner comprising a test port and an idle port (any microwave coupler has test port and an idle port including the one shown in figure 5 of Cusak et al. for microwave signal coupling), a horizontal

transmission airline in form of a slotted coaxial (Fig 1), two sliding carriages (slugs) carrying a metal-dielectric combination probe each and means (Slide Wire Power Supply) for remote horizontal position of the said combination probe (column 3, lines 33-43).

Regarding claims 5-6, pertinence to the discussion of the objection above, the claims 5-6 are rejected as being applied to claim 1.

Response:

This is correct. Cusak's tuner uses the same type of frame and movement mechanism as the tuner frame in this application. It is also said so in the specification. However the claims in this application are not about the tuner itself, which is already described as "Prior Art" or "Partly prior Art" in FIGS 8,9,10. Instead the (for clarification amended) claims are for the new structure of the metal-dielectric combination probes used in the existing tuner frame; this metal-dielectric combination probes provide higher reflection factors and higher frequency range and have not been known or patented before.

12. Claims 1, 5, 6 ar rejected under 35 USC 102(b) as being anticipated by Tsironis (6,297,649)

Response:

We respectfully disagree with the Examiner; Tsironis (6,297,649) describes a harmonic rejection load pull tuner, which uses vertical metallic (conducting) probes, held in place using a cylindrical dielectric body, exactly as Kiyokawa, which metallic probes slide making galvanic contact with the central conductor of the slotted airline of the tuner. The same arguments apply as already outlined versus Kiyokawa.

Claim Rejections – 35 USC 103

13. The following is a quotation of 35 USC 103 (a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole

would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Response:

The patent regulation subject is well understood. However, in this specific case it is not, and has not been obvious in the field of expertise, that a combination probe, as described in this application, is an obvious extension of known techniques. If it was about the thickness of the dielectric material used by Cusak et al., or a variation of permitivity or else, this might have been an extension to a known method; but changing the structure of the probe and using a metallic frame closely enveloping the core dielectric is not an obvious extension of thought; in particular it would rather seem contrary to common thought, since metal is known to create loss and it would rather have to be avoided; this is in fact the background line of thought used by Cusak et al. for employing exclusively dielectric material in his probes.

14. Claim 4 is rejected under 35 USC 103(a) as being unpatentable over Kiyokawa et al (6,515,465)

Regarding claim Kiyokawa et al. does not disclose electro-mechanical tuners with several diameters.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the probe of Kiyokawa with different diameters to use in different size of conductors is routine in the art since changing the size of diameter of probe to use in different conductor sizes does not change its function.

Response:

We respectfully disagree with the examiner: Kiyokawa's and Tsironis' probes are vertical conducting (meaning: metallic) stubs which act as quarter wavelength open stubs and reflect only a single frequency. Our probes include a dielectric cylinder which envelops the central conductor and slides along it. This is why Kiyokawa's resonant probes cover a much lower frequency range than ours.

Kiyokawa's probes are of very similar nature as Tsironis' (6,297,649) probes but

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fundamentally different than described in this application. Also, Kiyokawa's and Tsironis' probes cannot be used in combination to adjust the reflection factor, since each probe has a different resonance frequency. So it cannot be reasonably claimed that the our probe structure can be deduced from Kiyokawa's or Tsironis' probes.



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